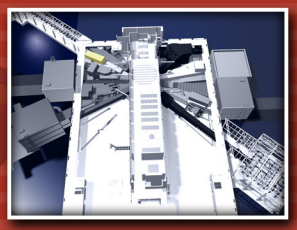
Instrument Fact Sheet

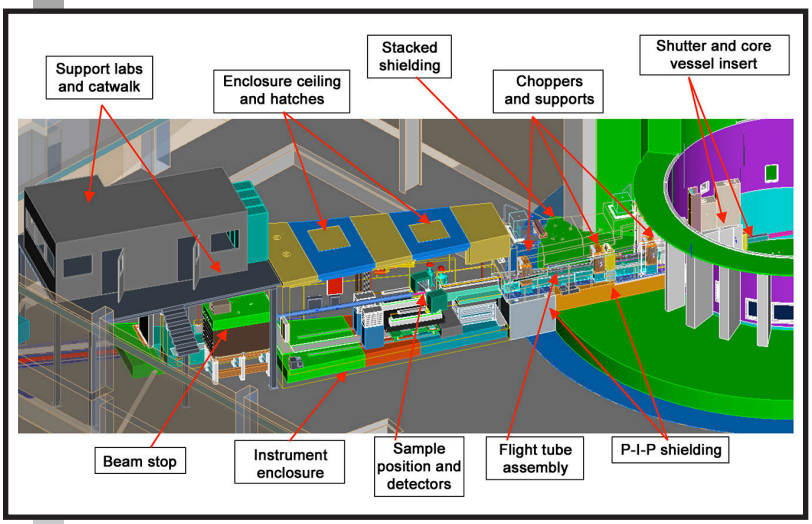
BEAM LINE 3

Spallation Neutron Source



SNAP – Spallation Neutrons and Pressure Diffractometer

The Spallation Neutrons And Pressure (SNAP) diffractometer, a high-flux, medium-resolution instrument, is used to study a variety of powdered, single-crystal, and amorphous materials under extreme pressure and temperature. The increased neutron flux coupled with large-volume pressure cells using large synthetic single-crystal opposed anvils significantly extends the pressure range currently accessible with the technique of neutron diffraction. The goal is to routinely achieve pressures of 50 to 100 GPa for a sample on the order of 1 mm^3. In addition, recent advances in next-generation detectors will allow the incident beam-focusing optics, pressure chamber, and detector array to be highly integrated, providing a flexible facility for materials studies under extreme conditions.



Applications

SNAP offers new opportunities for scientific studies involving the following:

- Hydrogen under extreme conditions
- Real-time in situ monitoring of "real rocks" as an analogue to the down-going slab in the subduction context
- Planetary ices—structure and strength of ices under pressure
- Silicate melts—glasses at high pressure and temperature and the dynamical changes occurring during heating and pressurization
- Strength and rheology of materials and the relationship to brittle and ductile failure, including stress release as a function of time
- Structural changes accompanying transitions in Fullerenes and their derivatives
- Hydrogen bonding in organic and inorganic systems as a function of pressure and temperature, including liquids

Specifications

Moderator	Decoupled poisoned supercritical hydrogen
Source-to-sample distance	15 m
Sample-to-detector distance	50 cm
Angular coverage	26° > 20 > 138° horizontal ±34° vertical

Wavelength range (bandwidth)	
Pressure range	<25 GPa
Temperature range	100-1500 K (w/ reduced pressure range)
Focused beam size	From 1 cm to <100 μm
Liquids and glasses	Q min = 0.7 $Å^{-1}$ Q max = 17 $Å^{-1}$
At 2Θ = 90° (crystalline powder) $0.5 \le d \le 8.0$ $Å^{-1}$	
At 2Θ = 35° (glasses & liquids) $0.7 \le d \le 17$ $Å^{-1}$	

Status: Operational

For more information, contact

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http://neutrons.ornl.gov/instruments/SNS/SNAP

SNS

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